Zootaxa 1040: 49–64 (2005)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

1040

A new species of *Trichomycterus* (Siluriformes: Trichomycteridae) from south Brazil and redescription of *T. iheringi* (Eigenmann)

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Abstract

Trichomycterus guaraquessaba, new species, from an isolated small river of the Eastern Basin, Guaraqueçaba, south Brazil, is described, and *T. iheringi* is redescribed based on type material. No uniquely derived features were found in *T. guaraquessaba* that is distinguished from its congeners from south and southeastern Brazil by the combination of several morphological characters. No uniquely derived features were found in *T. iheringi* that is distinguished from its congeners from south and southeastern Brazil by the combination of several morphological characters. Putative relationships and shared characters are discussed for both species and ecological notes for *T. guaraquessaba* are presented.

Key words: catfish, *Trichomycterus*, species description, redescription, systematics, Trichomycteridae

Resumo

Trichomycterus guaraquessaba, espécie nova, de um pequeno rio isolado da Bacia de Leste, Guaraqueçaba, Paraná, Sul do Brasil, é descrita e *T. iheringi* é redescrita baseada na análise do material tipo. Não foram observadas autapomorfias em *T. guaraquessaba* que pode ser diagnosticada pela combinação de diversos caracteres morfológicos e morfométricos compartilhados com as demais espécies congêneres do sul e sudeste do Brasil. Não foram observadas autapomorfias em *Trichomycterus iheringi* que pode ser diagnosticada pela combinação de diversos caracteres morfológicos e morfométricos compartilhados com as demais espécies congêneres do sul e sudeste do Brasil. Relações filogenéticas e caracteres compartilhados são discutidos para ambas espécies e dados ecológicos de *T. guaraquessaba* são apresentados.

Accepted by L. Page: 10 Aug. 2005; published: 23 Aug. 2005

Introduction

Trichomycteridae is a monophyletic group composed of eight subfamilies, 41 genera and about of 173 nominal species (de Pinna & Wosiacki, 2003), with many more to be described. Seven subfamilies are demonstrably monophyletic groups, but Trichomycterinae is the largest and clearly a polyphyletic group of Trichomycteridae (Wosiacki, 2002). Trichomycterinae is composed of five monotypic genera (*Eremophilus*, *Hatcheria*, *Bullockia*, *Silvinichthys*, and *Rhizosomichthys*), all defined by autapomorphies, and the genus *Trichomycterus* with about 100 species (de Pinna & Wosiacki 2003) that form a non-monophyletic group (de Pinna, 1989). Costa & Bockmann (1993) described the genus *Ituglanis* composed of some species formerly included in the genus *Trichomycterus*. *Scleronema* was proposed as a sister group of *Ituglanis* plus a large intrafamilial clade (Glanapteryginae, Sarcoglanidinae, Tridentinae, Stegophilinae and Vandelliinae) (Costa & Bockmann, 1993), although no subfamilial rank was proposed.

Despite the large number of species already known for "*Trichomycterus*", many species have been recently described (Barbosa & Costa, 2003; Fernández & Schaefer, 2003; Bockmann & Sazima, 2004; Bockmann *et al*. 2004; Triques & Vono, 2004; Wosiacki & Garavello, 2004; and Wosiacki, 2004), and the real estimate of the diversity within the genus is far from complete. Species-level identification within *Trichomycterus* is often precluded by the scarce information available on most nominal species. For these reasons, redescriptions of poorly known species are crucial (Arratia, 1998; Fernández, 2000) to achieve a better taxonomic and systematic knowledge of the genus.

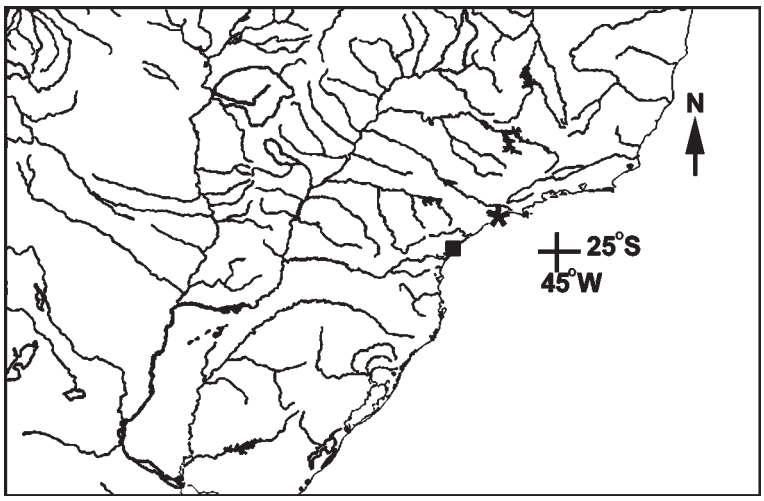

FIGURE 1. Approximate type locality of *Trichomycterus guaraquessaba* (square), rio Bracinho, Fazenda Salto Dourado, município de Guaraqueçaba, Paraná, Brazil. Type locality of *Trichomycterus iheringi* (asterisk), município de Santos, São Paulo Brazil.

The present paper is based on type material of *Trichomycterus iheringi* (Eigenmann, 1917) from Santos - São Paulo State, and *Trichomycterus guaraquessaba* n. sp. from rio Bracinho, Guaraqueçaba - Paraná State (Fig. 1). Both species are similar to each other, and the new species (*T. guaraquessaba*) was previously identified as *T. iheringi.* It was possible to recognize *T. guaraquessaba* as a new species only after the examination of the type material of *T. iheringi.*

Materials and Methods

All measurements were taken point-to-point, with dial calipers, on the left side of the specimens. Caudal peduncle length was taken from the origin of the last anal-fin ray to the middle of the caudal-fin base; caudal-peduncle depth was measured through the middle of its length. Remaining measurements followed Tchernavin (1944). Dorsal- and anal-fin ray counts included all branched and unbranched rays, visible under transmitted light. Osteological preparations were made according to a modified version of the method of Dingerkus & Uhler (1977). X-rays of dorsal and lateral views were taken with 25 kv, 4mA, 4–12 sec. Weberian complex and compound caudal centrum are not included in vertebral counts. Institutional abbreviations follow Leviton *et al.* (1985) with the addition of MHNCI for Museu de História Natural "Capão da Imbuia", Curitiba, Brazil; UFRJ for Laboratório de Ictiologia Geral e Aplicada, Universidade Federal do Rio de Janeiro, Brazil; and NUP for Núcleo de Pesquisa em Limnologia, Ictilogia e Aquacultura, Maringá, Brazil.

Trichomycterus guaraquessaba n. sp.

(Fig. 2, Table 1)

Holotype: MPEG 7916 (89.1mm SL); rio Bracinho, Fazenda Salto Dourado, Município de Guaraqueçaba, Paraná, Brazil; Wosiacki, W. B and Mateus, J. C., 13 August 1994.

Paratypes: MPEG 7917, 2 exs. (85.3 91.5 mm SL, C&S), MHNCI 7916, 3 ex. (68.0 82.0 mm SL), MZUSP 85531, 2 exs. (82.8–86.0 mm SL), collected with holotype.

Diagnosis: No uniquely derived features were found to diagnose *T. guaraquessaba*. *Trichomycterus guaraquessaba* shares with *T. castroi* de Pinna, *T. davisi* (Haseman), *T. iheringi*, *T. mboycy* Wosiacki & Garavello, *T. naipi* Wosiacki & Garavello, *T. papilliferus* Wosiacki & Garavello, *T. plumbeus* Wosiacki & Garavello, *T. stawiarski* (Miranda-Ribeiro), and *T. zonatus* (Eigenmann) the first pectoral-fin ray not prolonged as a filament and differs from all other congeners from south and southeastern Brazil [*T. albinotatus* Costa, *T. alternatus* (Eigenamnn), *T. auroguttatus* Costa, *T. bahianus* Costa, *T. brasiliensis* Lütken, *T. candidus* (Miranda-Ribeiro), *T. caudofasciatus* Alencar & Costa, *T. concolor*

Costa, *T. giganteus* Lima & Costa, *T. goeldii* Boulenger, *T. immaculatus* (Eigenmann & Eigenmann), *T. itacambirussu* Triques & Vono, *T. itatiayae* Ribeiro, *T. jequitinhonhae* Triques & Vono, *T. landinga* Triques & Vono, *T. longibarbatus* Costa, *T. maracaya* Bockma & Sazima, *T. mimonha* Costa, *T. mirissumba* Costa, *T. nigricans* Valenciennes, *T. pantherinus* Alencar & Costa, *T. potschi* Barbosa & Costa, *T. taroba* Wosiacki & Garavello, *T. trefauti* Wosiacki, *T. reinhardti* (Eigenmann), *T. triguttatus* (Eigenmann), *T. variegatus* Costa, and *T. vermiculatus* (Eigenmann)] by the presence of the first pectoral-fin ray prolonged as a filament. *Trichomycterus guaraquessaba* shares with the larger assemblage of species congeners from south and southeastern Brazil the presence of two pores s6 paired at the interorbital space [*vs*. one symphyseal pore s6 in *T. alternatus*, *T. giganteus*, *T. nigricans*, and *T. paquequerensis* (Miranda-Ribeiro)]. *Trichomycterus guaraquessaba* shares with *T. castroi*, *T. iheringi*, *T. plumbeus*, and *T. stawiarski* I-7 pectoral-fin rays (*vs.* I-5 in *T. mboycy*, *T. naipi*, and I-6 in *T. davisi*, *T. papilliferus*, and *T. zonatus*). *Trichomycterus guaraquessaba* is readily distinguished from *T. castroi* and *T. stawiarski* by the uniformly gray color pattern with small spots scattered over the flank and side of the caudal peduncle (*vs.* large and well defined spots and stripes). Furthermore, *T. guaraquessaba* can be distinguished from *T. iheringi*, *T. plumbeus*, and other congeners by the combination of the pelvic-fin margin not covering the urogenital opening (*vs.* covering the urogenital opening), and caudal-fin margin strongly truncate (*vs.* with attenuated edges, rounded or bilobed).

Description: Morphometric data for holotype and paratypes are given in Table 1.

Body elongate, roughly cylindrical close to head and gradually more compressed in trunk towards caudal fin. Profiles of trunk straight dorsally and slightly convex ventrally. Dorsal and ventral profiles of caudal peduncle straight (Fig. 2). Integument thick, especially over base of dorsal and anal fins. Small papillae on lips and scattered over lateral surface of head.

Head depressed, trapezoidal, or longer than wide (18.9–19.9 % SL), the transversal section at posterior tip of opercle wider than anteriorly at nostril, anterior margin straight (Fig. 4). Lateral region of eye slightly swollen by jaw muscles in both large and small specimens. Profiles of head straight dorsally and convex ventrally. Eyes rounded, well defined rim, dorsally oriented, covered by thin skin, not distinctly separated from surface of eyeball. Ocular structures readily visible on surface of skin, not deeply sunken. Orbital rim not free. Anterior nostril larger than posterior, surrounded by fleshy flap of integument. Posterior nostril surrounded anteriorly by thin flap of integument. Anterior nostril same size as eye diameter. Gill membranes thick, united to isthmus only at anteriormost point. Gill openings not constricted. Seven branchiostegal rays externally (8 in C&S) visible from below. Mouth subterminal, its corners laterally oriented. Lower lip with conspicuous lateral fleshy lobes, internal to origin of rictal barbels. Anterior margin of upper lip rounded. Small papillae on external surface of upper lip and large papillae continuous inside mouth at region of teeth attachment. Upper lip continuous with dorsal surface of head. Barbels long: nasal 58.1–81.9, maxillary 66.7–83.9, and rictal barbel

length 53.3–71.0 % HL. Barbels with large bases and gradually narrowing towards tip. Nasal barbels reaching base of anterior opercular odontodes; maxillary barbels reaching tip of posterior opercular odontodes; rictal barbels reaching tip of posterior most interopercular odontodes. Origin of nasal barbels on posterolateral portion of integument flap around anterior nostril. Interopercular patch of odontodes long, 22–23 conical odontodes covered by thick integument; external series smaller and straight and internal series larger, curved medially. Opercular patch of odontodes rounded, with 18–19 conical odontodes, anterior ones smaller and straight, posterior ones larger and curved medially. Sensory canals composed of supraorbital canal complete and infraorbital incomplete. Infraorbital anterior section pores i1 and i3, and posterior section pores i10 and i11. Supraorbital pores s1, s2 and s6. Two pores s6 paired at interorbital space.

Pectoral fin with truncate margin, I-7 rays, first longest ray not prolonged as short filament. Dorsal fin with margin semicircular, II/6- 8 (Holotype, II-7) rays, second the longest. Anal fin slightly elongate in overall shape, slightly smaller than dorsal fin, II-5 rays, second the longest, origin at vertical through last dorsal-fin ray. Pelvic fin with origin anterior to dorsal-fin origin, rounded margin, not in contact with anal and urogenital openings, I-4 rays, third the longest. Caudal-fin margin strongly truncate, without attenuated edges, margin slightly wider than remaining caudal region, I/11/I principal rays, branched rays splitting three times. Only the first dorsal and ventral caudal-fin accessory rays visible. Anal and urogenital openings closer to anal-fin origin than to pelvic-fin base.

Free vertebrae 37. Ribs 14–15 pairs, first one thickest, second to 12–13th pairs slightly longest, last pair rudimentary and free. Dorsal-fin pterygiophores 8, first inserting in front of neural spine of 18th free vertebra. Anal-fin pterygiophores 6, first inserting in front of haemal spine of 22nd free vertebra. Dorsal procurrent rays 15. Ventral procurrent rays 8. Caudal skeleton composed of pleurostyle, hypurals fused 3+4+5, and fused parahypural and hypurals 1+2.

Color pattern: Refer to figure 4 for general view of color pattern in alcohol. The pattern is the same for smaller (68.9mm SL) to larger (89.1mm SL) specimens. Uniform gray on dorsal surface of trunk, gradually lighter laterally. Dorsal surface of head gray, darker on occipital region. Cheek, over the jaw-muscle lighter, with few chromatophores. Nasal barbel with few chromatophores on dorsal surface. Maxillary and rictal barbels slightly pigmented on dorsal surface. Ventral surfaces of head, trunk and caudal peduncle unpigmented. Small spots, less than half eye-diameter, scattered over flank and lateral of caudal peduncle and caudal fin. Pectoral fin with few chromatophores over dorsal surface from base to half of length-rays. Pelvic fins unpigmented. Anal fin with few chromatophores from base to half of ray length, lighter than dorsal fin. Dorsal fin with few chromatophores over rays, darker at base, gradually lighter to tip. Caudal fin with small uniform spots from base to tip, over rays and inter-rays, larger and darker at base, gradually small and light to tip.

Distribution: Known only from the type locality.

TABLE 1. Mophometric and meristic data for *Trichomycterus guaraquessaba* (n=6) and *T. iheringi* (n=6).

	Trichomycterus guaraquessaba				*Trichomycterus iheringi*			
	Holotype (mm)	Range		Mean	Holotype (mm)	Range		Mean
Standard length (SL)	89.1	68.9	89.1	83.6	139.6	117.6	139.6	126.3
Percentage of SL								
Head length (HL)	17.1	18.9	19.9	19.5	26.9	19.3	22.1	21.3
Predorsal length	56.1	60.1	63.9	61.4	82.6	59.2	64.9	60.9
Prepelvic length	48.9	53.8	55.6	55	74.6	53.3	56.9	54
Preanal length	65.5	71.7	73.5	72.5	102.7	73.6	78.1	75.3
Pectoral girdle width	13	13.5	14.7	14.1	22.5	15.2	17	16.4
Trunk length	33.5	37.6	39	38.3	54.3	35.7	38.9	37
Pectoral-fin length	13.1	12.9	14.9	14.5	18.7	11.8	14	13.6
Pelvic-fin length	9.5	9.7	11.3	10.6	11.1	8	11	10
Distance between pelvic-fin base and anus	11.7	11.8	13.2	12.5				
Caudal peduncle length	18.3	19.3	20.7	20.4	26.7	19.1	20.6	19.4
Caudal peduncle depth	10.5	11.2	12.3	11.9	17.7	10.3	12.7	11.5
Body depth	12.2	12.6	14.4	13.2	22.9	14.9	17.9	16
Dorsal-fin length	10.3	9.1	12.1	11.5				
Anal-fin length	6.8	6.7	9.1	7.5				
Percentage of HL								
Head width	15.4	80.7	90.1	84.9	23.2	76.9	86.2	81.8
Nasal barbel length	12.5	58.1	81.9	67.6	9	25.2	43.1	37
Maxillary barbel length	14	66.7	83.9	77.6	10	37.2	47.2	41.4
Rictal barbel length	11	53.3	71	61.9	6	22.3	37.7	34.6
Snout length	7.4	43.2	47	43.9	13.7	47.1	50.9	48.6
Interorbital width	3.6	19.8	25.6	21.1	7	21.7	26	22.9
Mouth width	6.4	34.4	42.9	37.1	11.8	38.6	47.8	42.9
Eye diameter	1.5	7.7	9.7	8.5	2.7	5.5	10	9
Dorsal rays	II-7	II/6-II/ 7-II/8			II-9	II/9-II/10-III/10		
Pectoral rays	I-7	I-7			I-7	I-7		
Pelvic rays	I-4	I-4			I-4	I-4		
Anal rays	II-5	II-5			II-5	I-5 / II-5		
Caudal rays	I-11-I	I-11-I			I-11-I	I-11-I		

FIGURE 2. *Trichomycterus guaraquessaba*, Holotype, MPEG 7916, 89.1 mm SL, rio Bracinho, Fazenda Salto Dourado, Município de Guaraqueçaba, Paraná, Brazil: A) lateral, B) dorsal, and C) ventral views.

Etymology: The specific epithet "*guaraquessaba*" is derived from the name of Município de Guaraqueçaba and the Área de Proteção Ambiental de Guaraqueçaba (APA-Guaraqueçaba), the area of occurrence of the new species. A noun in apposition.

Remarks: *Trichomycterus* and Trichomycterinae are not monophyletic groups, but the allocation of *T. guaraquessaba* to this genus is the best solution for maintaining nomenclatural stability. *Trichomycterus guaraquessaba* does not have the features observed in *Bullockia*, *Eremophilus*, *Hatcheria*, *Rhizosomichthys*, *Silvinichthys*, all formerly included in Trichomycterinae, and can not be allocated to any of these genera. The morphological similarity among *Trichomycterus* species is high and the identification is, often, impossible without the examination of type material. Few species present distinct autapomorphies (*T. castroi*, *T. ramosus* Fernández, *T. papilliferus*, *T. trefauti*), and most species have been diagnosed by the combination of characters. The last revision of the group was made by Eigenmann (1918) and included the transcriptions of the original descriptions of all species known for the time. It is the best reference for the identification of Trichomycteridae species, but its descriptions, keys and drawings are outdated. *Trichomycterus guaraquessaba* could be correctly recognized as a new species only after the examination of the type material of *T. iheringi*. *Trichomycterus guaraquessaba* is slightly similar to this species in color pattern, but it is distinguished by the number of dorsal branched rays (6–8 *vs*. 9–10), caudal-fin margin strongly truncate (*vs.* rounded), pectoral girdle width (13.5–14.7 *vs*. 15.2–17.0 % SL), body depth (12.6–14.4 *vs*. 14.9–

17.9 % SL), nasal barbel length (58.1–81.9 *v*s. 25.2–43.1 % HL), maxillary barbel length (66.7–83.9 *vs*. 37.2–47.2 % HL), and rictal barbel length (53.3–71.0 *vs*. 22.3–37.7 % HL). A strongly truncate caudal-fin margin is a feature shared by few species of Trichomycterinae, e.g., *T. immaculatus*, *T. heterodontus* (Eigenmann) and *Ituglanis parkoi* (Miranda-Ribeiro). However, *T. guaraquessaba* is distinct among these species by the combination of other characteristics presented above. On the other hand, a truncate caudal fin with attenuated edges is shared by a large assemblage of species (*T. castroi*, *T. zonatus*, *T. paolence*, *T. reinhardti*, *T. davisi*, *T. alternatus*, *T. papilliferus* and *T. plumbeus*, and *T. trefauti*), all occurring in the south and southeastern Brazil plus *T. taczanowskii* Steindachner from Peru. The large majority of Trichomycterinae species have a rounded caudal-fin margin like that of Nematogenyidae [*Nematogenys inermis* (Guichenot)], the sister group of Trichomycteridae. A phylogenetic analysis is necessary to understand the role of the caudal-fin shape in elucidating the relationships of Trichomycterinae species.

Ecological notes: The rio Bracinho, type locality of *Trichomycterus guaraquessaba*, is a typical Atlantic Rain Forest stream, with clear water, falls, rapids and moderate current flowing over the rocky beds, intercalated with pools. The river runs in an alluvial valley bordered by the slopes of adjacent hills, and the riparian vegetation is a dense, well preserved forest. *Trichomycterus guaraquessaba* occurs associated with stones and plant debris on the bottom and is syntopic with *Astyanax* sp., *Deuterodon langei* Travassos, *Hollandichthys multifasciatus* (Eigenmann & Norris), *Mimagoniates microlepis* (Steindachner), *Characidium* sp., *Oligosarcus hepsetus* (Cuvier), *Rhamdioglanis* sp., *Pimelodella* sp., *Acentronichthys leptos* Eigenmann & Eigenmann, *Rhamdia quelen* (Quoy & Gaimard), *Ancistrus* sp., *Pseudotothyris obtusa* (Miranda-Ribeiro), *Scleromystax barbatus* (Quoy & Gaimard), and *Gymnotus carapo* Linnaeus.

***Trichomycterus iheringi* (Eigenmann, 1917)**

(Figs. 3, 4; Table 1)

Pygidium iheringi Eigenmann, 1917:697 (Brazil, São Paulo). Eigenmann, 1918:330. Henn, 1928:80. Gosline, 1945:60. Ibarra & Stewart, 1987:73.

Trichomycterus iheringi- Miranda-Ribeiro, 1918:725. Fowler 1954:27. Burgess, 1989:322. Bizerril, 1994:623. de Pinna & Wosiacki, 2003:282. Costa, 1992:103. Eschmeyer, 1998:760. Barbosa & Costa, 2003:287. Bockmann & Sazima, 2004:61. Bockmann, Casatti & de Pinna, 2004:226. Triques & Vono, 2004:162. Wosiacki, 2004:9. Wosiacki & Garavello, 2004:9.

Holotype: CAS 64585 (Ex. IU 10785), 139.6mm SL, Santos, São Paulo Brazil, collected by R. von Ihering.

Paratypes: CAS 64586, 3 ex. (117.6 128mm SL). Orig. n. IU 10785, collected with holotype; FMNH 58074, 2 ex. (125.7–134.1mm, X-rays), Sapina, São Paulo, Brazil, collected by J.D.Haseman, 23 July 1908.

Diagnosis: No uniquely derived features were found to diagnose *T. iheringi*. *Trichomycterus iheringi* shares with *T. castroi*, *T. davisi*, *T. guaraquessaba*, *T. mboycy*, *T. naipi*, *T. papilliferus*, *T. plumbeus*, *T. stawiarski*, and *T. zonatus* the first pectoral-fin ray not prolonged as a filament and differs from all other congeners from south and southeastern Brazil (*T. albinotatus*, *T. alternatus*, *T. auroguttatus*, *T. bahianus*, *T. brasiliensis*, *T. candidu*, *T. caudofasciatus*, *T. concolor*, *T. giganteus*, *T. goeldii*, *T. immaculatus*, *T. itacambirussu*, *T. itatiayae*, *T. jequitinhonhae*, *T. landinga*, *T. longibarbatus*, *T. maracaya*, *T. mimonha*, *T. mirissumba*, *T. nigricans*, *T. pantherinus*, *T. potschi*, *T. taroba*, *T. trefauti*, *T. reinhardti*, *T. triguttatus*, *T. variegatus*, and *T. vermiculatus*) by the presence of the first pectoral-fin ray prolonged as a filament. *Trichomycterus iheringi* shares with the larger assemblage of species congeners from south and southeastern Brazil the presence of two pores s6 paired at the interorbital space (*vs.* one symphyseal pore s6 in *T. alternatus*, *T. giganteus*, *T. nigricans*, and *T. paquequerensis*). *Trichomycterus iheringi* shares with *T. castroi*, *T. guaraquessaba*, *T. plumbeus*, and *T. stawiarski* I-7 pectoral-fin rays (*vs.* I-5 in *T. mboycy*, *T. naipi*, and I-6 in *T. davisi*, *T. papilliferus*, and *T. zonatus*). *Trichomycterus iheringi* is readily from *T. castroi* and *T. stawiarski* by the uniform light tan color pattern with numerous, poorly defined small spots over the dorsal and lateral portions of the head, trunk and caudal peduncle (*vs.* large and well defined spots and stripes). Furthermore, *T. iheringi* can be distinguished from *T. guaraquessaba*, *T. plumbeus*, and other congeners by the combination of pelvic-fin margin distance from the urogenital opening equal to half of its the fins length (*vs.* in contact with urogenital opening or covering it), caudal fin rounded (*vs.* truncate as in *T. guaraquessaba*), and 9–10 branched rays in the dorsal fin (*vs.* 6–8).

Redescription: Morphometric data for holotype and paratypes are given in Table 1. "T1"

Body elongate, roughly cylindrical close to head and gradually more compressed in trunk towards caudal fin. Profiles of trunk straight dorsally and slightly convex ventrally. Dorsal and ventral profiles of caudal peduncle straight. Integument thick, especially over base of dorsal and anal fins. Small papillae on lips and scattered over lateral surface of head.

Head wide, rounded and depressed, slightly longer than wide, the transversal section at posterior tip of opercle slightly wider than anteriorly at nostril, anterior margin rounded. Lateral region of eye slightly swollen by jaw muscles in both large and small specimens. Profiles of head straight dorsally and convex ventrally. Eyes rounded, well defined rim, dorsally oriented, covered by thin skin, distinctly separated from surface of eyeball. Ocular structures readily visible on surface of skin, not deeply sunken. Orbital rim not free. Anterior nostril same size as posterior one, surrounded by fleshy flap of integument. Posterior nostril with thin flap of integument anteriorly. Anterior and posterior nostrils half diameter of eye. Gill membranes thick, united to isthmus only at anteriormost point. Gill openings not constricted. Five branchiostegal rays visible externally, 7–8 in X-rayed

specimens (Fig. 4). Mouth subterminal, its corners laterally oriented. Lower lip with conspicuous lateral fleshy lobes, internal to origin of rictal barbels. Anterior margin of upper lip rounded. Small papillae on external surface of upper lip; large papillae continuous inside of mouth to region of teeth attachment. Upper lip continuous with dorsal surface of head. Barbels long with large bases and gradually narrowing towards tip. Tips of nasal barbels reaching midway between posterior rim of eye and base of anterior opercular odontodes; tips of maxillary barbels reaching tip of posterior opercular odontodes; tips of rictal barbels reaching base of posterior most interopercular odontodes. Origin of nasal barbels on posterolateral portion of integument flap around anterior nostril. Interopercular patch of odontodes long, 20–22 conical odontodes covered by thick integument, anteriormost odontodes smaller and slightly curved medially, gradually longer and more curved distally. Opercular patch of odontodes rounded, covering posterior edge of opercle, 25–27 conical odontodes, anterior ones smaller and straight, gradually longer and curved distally. Supraorbital canal complete, infraorbital incomplete. Infraorbital anterior section pores i1 and i3, and posterior section pores i10 and i11. Supraorbital pores s1, s2 and s6 paired.

FIGURE 3. *Trichomycterus iheringi,* Holotype: CAS 64585 (ex IU 10785), 139.6 mm SL, Santos, São Paulo Brazil: A) lateral, B) dorsal, and C) ventral views..

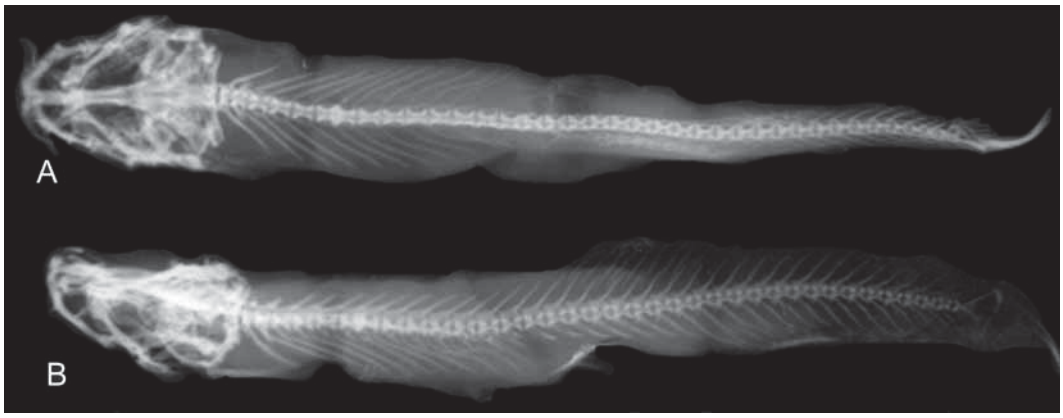

FIGURE 4. *Trichomycterus iheringi,* Paratype: FMNH 58074, 125.7 mm SL, Sapina, São Paulo Brazil. A) dorsal, and B) lateral views.

Pectoral fin with rounded margin, I-7 rays, first short and thickest, third and fourth longest. Dorsal-fin with margin semicircular when expanded, II-III/9-10 (Holotype, II/9) rays, fourth the longest. Anal fin slightly elongate in overall shape, slightly smaller than dorsal fin, I/5–II/5 (Holotype, II/5) rays, fourth the longest, origin at vertical through seventh dorsal-fin ray. Pelvic-fin origin anterior to dorsal-fin origin, rounded margin, not reaching anal and urogenital openings, I/4 rays, second and third longest. Caudal fin rounded, margin distinctly wider than remaining caudal region, I/11/I principal rays, branched rays splitting three times. Only the first dorsal and ventral caudal-fin accessory rays visible. Anal and urogenital openings closer to anal-fin origin than pelvic-fin base.

Free vertebrae 35. Ribs 11 pairs, first one thickest, 3rd–4th longest. Dorsal-fin pterygiophores 9, first inserting in front of the neural spines of 15th–16th free vertebrae. Anal-fin pterygiophores 6, first in front of hemal spines of 21st –22nd free vertebrae. Dorsal procurrent rays 18. Ventral procurrent rays 8. Caudal skeleton composed of pleurostyle, hypurals 4+5, hypural 3, and fused parhypural and hypurals 1+2 (Fig. 4).

Color pattern: Refer to figure 2 for general view of color pattern in alcohol. The pattern is the same for smaller (117.6 mm SL) to larger (139.6 mm SL) specimens. Uniform light tan on dorsal surface of trunk, gradually lighter laterally. Numerous, poorly defined spots over dorsal and lateral portions of head, trunk and caudal peduncle. Spots coalescent over head at the occipital and interorbital space. Spots larger at dorsal trunk and caudal peduncle, gradually less numerous and smaller ventrally. Nasal, maxillary and rictal barbels unpigmented. Ventral surfaces of head, trunk and caudal peduncle unpigmented. Pectoral fin with few small spots over dorsal surface scattered from base to half of its length. Pelvic fins unpigmented. Dorsal fin with few small spots scattered from base to half of its length rays. Caudal fin with few spots over rays, larger and closer each other at base, gradually smaller and scattered to margin.

Distribution: Known from the type-locality, Santos, on the costal area of São Paulo

State, and headwaters of rio Tietê (Paraná basin), southeastern Brazil. The Sapina locality cited by Eigenmann (1917 and 1918) for the paratypes was not located. However, Eigenmann (1911) cited "Sapina, Rio Tieté, into Paraná. Coll. Nos. 1599-1616. Four miles from the city, July 23, 1908", for the Paratypes. In the same paper, cited "Santos, coast of São Paulo. July 23, 1908" [no July 3, 1908 in Eigenmann, 1918] for the Holotype. It is assumed that Sapina is a locality on the headwaters of rio Tietê, close to Santos.

Remarks: The present redescription of *Trichomycterus iheringi* was based on type material of the CAS and FMNH. The holotype and paratypes were in a good state of preservation (Fig. 2), with the color pattern slightly pale. Eigenmann (1917) presented *T. iheringi* in a short description based on six specimens which was adequate at the time, but incomplete by current standards. In the next year Eigenmann (1918; PL.50: 5) presented a transcription of the original description, with a very sharp drawing of the type. Eigenmann (1917, 1918), with no justification, allied *T. iheringi* to *T. punctatissimus* Castelnau, from the rio Araguaia (Tocantins basin). Eigenmann (1918; PL. 45: 1) presented a cartoonish drawing of *T. punctatissimus* from Castelnau (1855), and a short text of the characters in the key of that paper ("Sides and back with minute dark specks and vermiculations between them; origin of dorsal over origin of ventral"). It was not possible to analyze the type material of *T. punctatissimus*, and the original description (Castelnau, 1855) does not offer features to support the relationships of this species to *T. iheringi.* Only the color pattern cited by Castelnau (1855) for *T. punctatissimus* ("sa couleur générale dun châtain clair. Il est entiérement couvert de très petits point dun brun obscure très serrés et couvrant les nageoires supérieures. Le dessous du corps et les nageoires inferieures sont dun brun jaune"), cited by Eigenmann (1918) suggests some similarity to *T. iheringi*. However, the presence of several small spots covering the dorsum and sides of the head, trunk and caudal peduncle is a color pattern in many *Trichomycterus* species (*T. davisi*, *T. brasiliensis*, *T. bahianus*, *T. mimonha*, *T. mirissumba*, *T. taroba*, and *T. rivulatus* Valenciennes, among others), in *Eremophilus mutisii* Humboldt, in *Ituglanis amazonicus* (Steindachner), *I. eichorniarum* (Miranda-Ribeiro), and *I. proops* (Miranda-Ribeiro). Only a detailed phylogenetic analysis will allow inferences about the evolution of the color pattern in the relationships of the *Trichomycterus* species and of the non monophyletic group "Trichomycterinae".

Bockmann & Sazima (2005) proposed a group of species, *T. maracaya*, *T. mimonha*, *T. potschi*, and *T. vermiculatus,* as members of *T. brasiliensis* species-complex based on the presence of fours longitudinal rows of well-defined blotches, plus I/5-6 pectoral-fin rays. As observed in the type material, *T. iheringi* does not present the color pattern of four rows of well-defined blotches; hence it could not be included as a member of this group. In addition, all specimens of the type material of *T. iheringi* have I/7 pectoral-fin rays as observed by Eigenmann (1917 and 1918; P.8), in contrast to that described by Bockmann & Sazima (2005). In a slightly different way Wosiacki (2002) proposed, in a phylogenetic analysis of Trichomycterinae, a different group composed of species with 6 or fewer

pectoral-fin rays [*T. candidus*, *T. naipi*, *T. mboycy*, *T. taroba*, and *Trichomycterus* sp. n. ("pelvic-less")]. Six or fewer pectoral-fin rays also are present in all *Ituglanis* species and in the clade composed of Glanapteryginae, Sarcoglanidinae, Tridentinae, Stegophilinae, and Vandelliinae (*sensu* de Pinna, 1998), interpreted as the result of independent evolution (Wosiacki, 2002).

Bizerril (1994) related *T. iheringi*, apparently without an analysis of material, to an assemblage of species (*T. mimonha*, *T. mirissumba*, *T. triguttatus*, *T. vermiculatus*, and *T. concolor*) based on the supraorbital pores being closer to the margin of the eyeball than to the sagittal line, as proposed by Costa (1992). However, as observed in the holotype (Fig. 2) and paratypes, the supraorbital pores of *T. iheringi* are closer to the sagittal line than the margin of the eyeball, contrary to the proposal of Bizerril (1994).

Phylogenetic assignments: *Trichomycterus guaraquessaba* and *T. iheringi* share with all south and southeastern Brazil congeneric species the presence of s6 pores paired, one in each supraorbital canal, except *T. alternatus*, *T. giganteus*, *T. nigricans*, and *T. paquequerensis* with one epiphyseal pore s6 fused at the sagittal line. Costa (1992) proposed two monophyletic groups for species of *Trichomycterus* from south and southeastern Brazil: 1) Supraorbital pore s6 paired, each pore closer to the orbit than to the sagittal line; and 2) supraorbital pore s6paired, each pore closer to the sagittal line than to the orbit or fused into a single epiphyseal pore. The position of the supraorbital pore s6 is very variable intra- and interspecifically among Trichomycterinae; however, in a large assemblage of species, the pore s6 opening is directly from the supraorbital canal as in Copionodontinae and *Trichogenes,* the basalmost groups of Trichomycteridae. Wosiacki (2002) reported that there exists a branching from the supraorbital canal above the epiphyseal bar, in a medial direction, of which the external opening s6 either can be single and median (both sides fused) and at the end of a relatively long canal (equaling the distance between the supraorbital canal and the sagittal plane), or paired having a pore at each side of the sagittal plane between it and the supraorbital canal. The single pore condition is considered as a more derived state. The presence and length of a branch from the supraorbital canal opening either in a single or paired pore as observed in *Trichomycterus alternatus*, *T. brasiliensis*, *T. giganteus*, *T. mirissumba*, *T. mimonha*, *T. nigricans*, and *T. paquequerensis* probably is a better way of indicating the position of pore s6 than the present reference to distance of the eyes. Regardless, *T. guaraquessaba* and *T. iheringi* have the plesiomorphic state without a branching for pore s6. *Trichomycterus guaraquessaba* and *T. iheringi* share, with an assemblage of species from south and southeastern Brazil (*T. nigricans*, *T. davisi*, *T. stawiarski*, *T. castroi*, *T. triguttatus*, *T. immaculatus*, *T. itatiayae*, *T. mirissumba*, *T. zonatus*, *T. naipi*, *T. taboba*, *T. papilliferus*, *T. mboycy* and *T. plumbeus*), the presence of a window at least half of the diameter of the optic foramen in the lateral of the orbito-sphenoid observed by Wosiacki (2002). This feature is an apormophy not observed in the Andeans and trans-Andean species of *Trichomycterus*.

Comparative material: As for Wosiacki (2004), plus *Trichomycterus trefauti* MZUSP 79911, Holotype; MZUSP 36966, 5 ex. 3 C&S, Paratypes; MPEG 7896, 2 ex., Paratypes.

Acknowledgments

I thank to A. Prudente (MPEG), M. Hoogmoed (MPEG) and F. Lima (MZUSP) for suggestions on the manuscript. I am indebted to P. Buckup (MNRJ), O. Oyakawa (MZUSP), R. Reis (MCP) and V. Abilhôa (MHNCI) for the loan of material. I thank W. Eschmeyer (CAS) and B. Chernoff (FMNH) for their advice during my visit to the USA to analyze type material and to K. Swagel for the X-rays. The present paper was partially supported by FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo), and by financial support for foreign students provided by the Lakeside Foundation (CAS). I thank the Fundação O Boticário for preserving the region containing the type locality of *Trichomycterus guaraquessaba.*

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